ABSTRAK

Seng Oksida (ZnO) telah banyak dikembangkan dalam bidang pengolahan air limbah sebagai fotokatalis pendegradasi zat warna. Efisiensi fotokatalis ZnO dapat ditingkatkan dengan modifikasi bentuk nanostruktur dengan menghasilkan ZnO dalam bentuk *nanowires*. Penelitian ini bertujuan membuat fotokatalis ZnO *nanowires* dengan variasi penambahan H_2O_2 sebanyak 0, 0,5, 1, dan 2 ml yang disintesis dengan metode laser ablasi-hidrotermal. Penambahan H_2O_2 berfungsi untuk mengontrol jumlah, panjang, dan diameter *nanowires*. Hasil sintesis dikarakterisasi menggunakan Spektroskopi UV-VIS, *Scanning Electron Microscope - Energy Dispersive X-Ray Spectroscopy* (SEM-EDX), dan *X-Ray Diffraction* (XRD). Fotokatalis ZnO yang diberi penambahan H_2O_2 menghasilkan energi gap ZnO pada rentang 3,07-3,27 eV. Morfologi fotokatalis ZnO dari hasil SEM menunjukkan semakin banyak H_2O_2 mengakibatkan semakin banyak *nanowires* yang dihasilkan dengan ukuran panjang dan diameter yang semakin besar. Fotokatalis ZnO menghasilkan fasa zincite (ZnO) dengan struktur heksagonal (*wurtzite*) dan ukuran kristal ZnO meningkat seiring penambahan H_2O_2. Uji aktivitas degradasi terhadap zat warna Rhodamine 6G mengindikasikan bahwa performa terbaik ditunjukkan pada sampel ZnO-B dengan variasi penambahan H_2O_2 sebesar 0,5 ml yang menghasilkan nilai persen degradasi hingga 88% dengan waktu penyinaran selama 30 menit. Berdasarkan hasil pengujian, penambahan H_2O_2 berpengaruh terhadap sifat optik, struktur morfologi, struktur kristal, dan kemampuan fotokatalisis ZnO. Komposisi terbaik pada pembentukan fotokatalis ZnO didapatkan pada variasi penambahan 0,5 ml H_2O_2.

Kata kunci: ZnO *nanowires*, laser ablasi, hidrotermal

ABSTRACT

Zinc Oxide (ZnO) has been widely developed in the field of wastewater treatment as a dye-degrading photocatalyst. The efficiency of ZnO photocatalysts can be improved by modification of the shape of nanostructures by producing ZnO in the form of nanowires. This study aims to make ZnO nanowires photocatalysts with variations in the addition of H_2O_2 as much as 0, 0.5, 1, and 2 ml synthesized by hydrothermal ablation-laser method. The addition of H_2O_2 serves to control the number, length, and diameter of nanowires. The synthesis results were characterized using UV-VIS Spectroscopy, Scanning Electron Microscope - Energy Dispersive X-Ray Spectroscopy (SEM-EDX), and X-Ray Diffraction (XRD). ZnO photocatalysts added with H_2O_2 produce ZnO gap energy in the range of 3.07-3.27 eV. The morphology of ZnO photocatalysts from the SEM results shows that more H_2O_2 results in more nanowires being produced with larger lengths and diameters. ZnO photocatalysts produce a zincite phase (ZnO) with a hexagonal structure (wurtzite), and the ZnO crystal size increases with the addition of H_2O_2. The degradation activity test of Rhodamine 6G dye indicated that the best performance was shown in ZnO-B samples with a variation in H_2O_2 addition of 0.5 ml which resulted in a degradation percent value of up to 88% with an irradiation time of 30 minutes. Based on the test results, the addition of H_2O_2 affects the optical properties, morphological structure, crystal structure, and photocatalysis ability of ZnO. The best composition in the formation of ZnO photocatalysts is obtained in the variation of adding 0.5 ml of H_2O_2.

Keywords: *ZnO nanowires, laser ablation, hydrothermal*